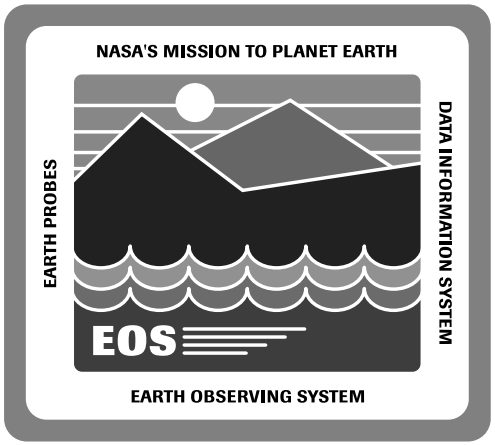

ECS Architecture (Cont.)

Narayan Prasad

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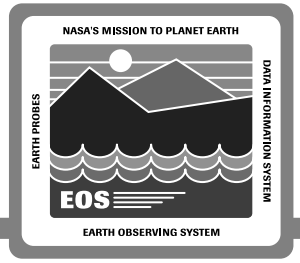
ECS Release A SDPS/CSMS Critical Design Review
14 August 1995

Roadmap



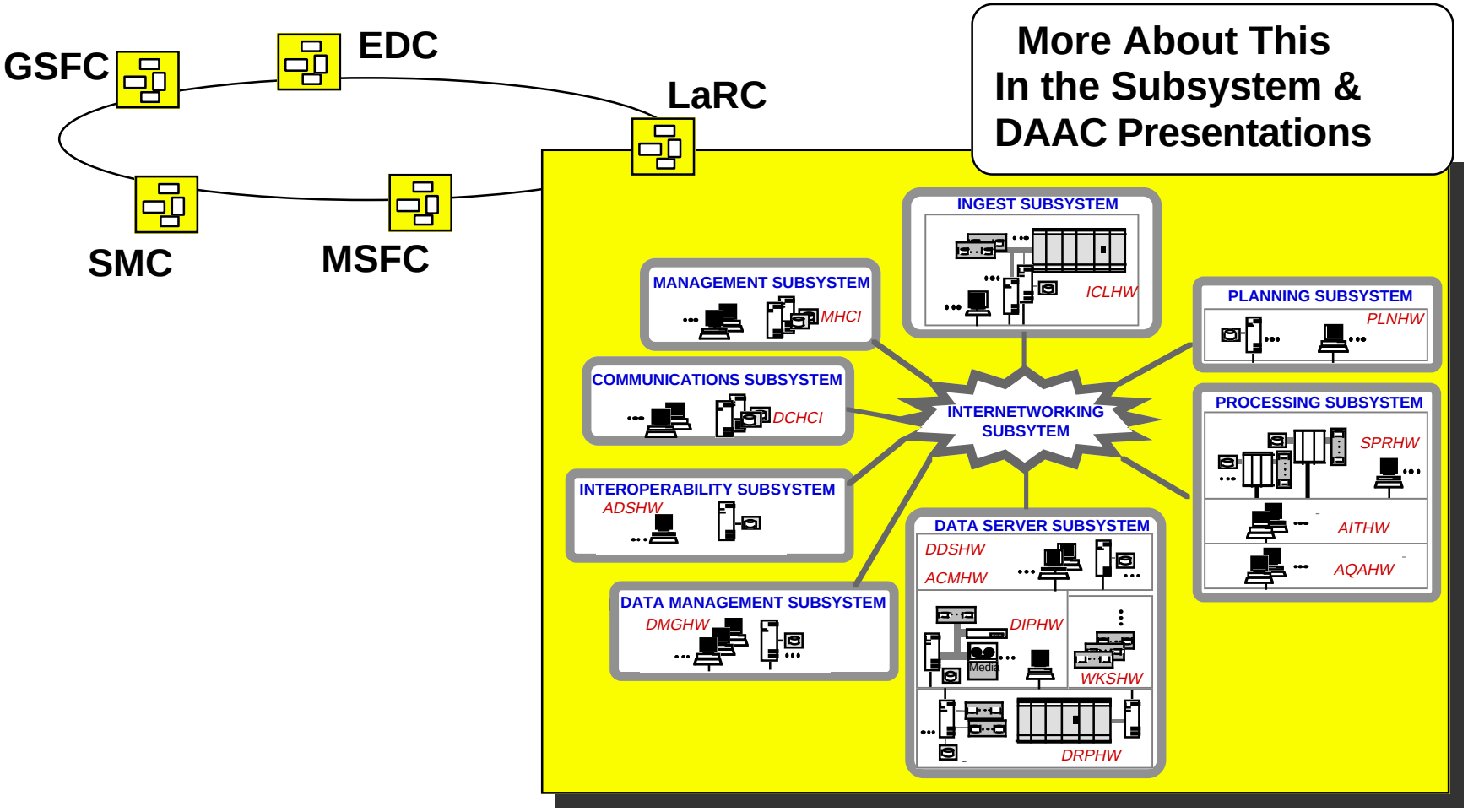
Overview of Release A Hardware

Overview of LAN Architecture
- **Design Drivers**
- **DAACs (generic)**
- **SMC**

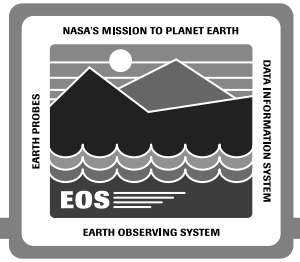
Overview of Information Security
- **Drivers and Strategy**
- **Network-based Security**

Sizing and Selection Approach
- **DBMS**
- **Servers**
- **Science Processors**
- **Disks and Storage Devices**
- **Networks**

Hardware Overview



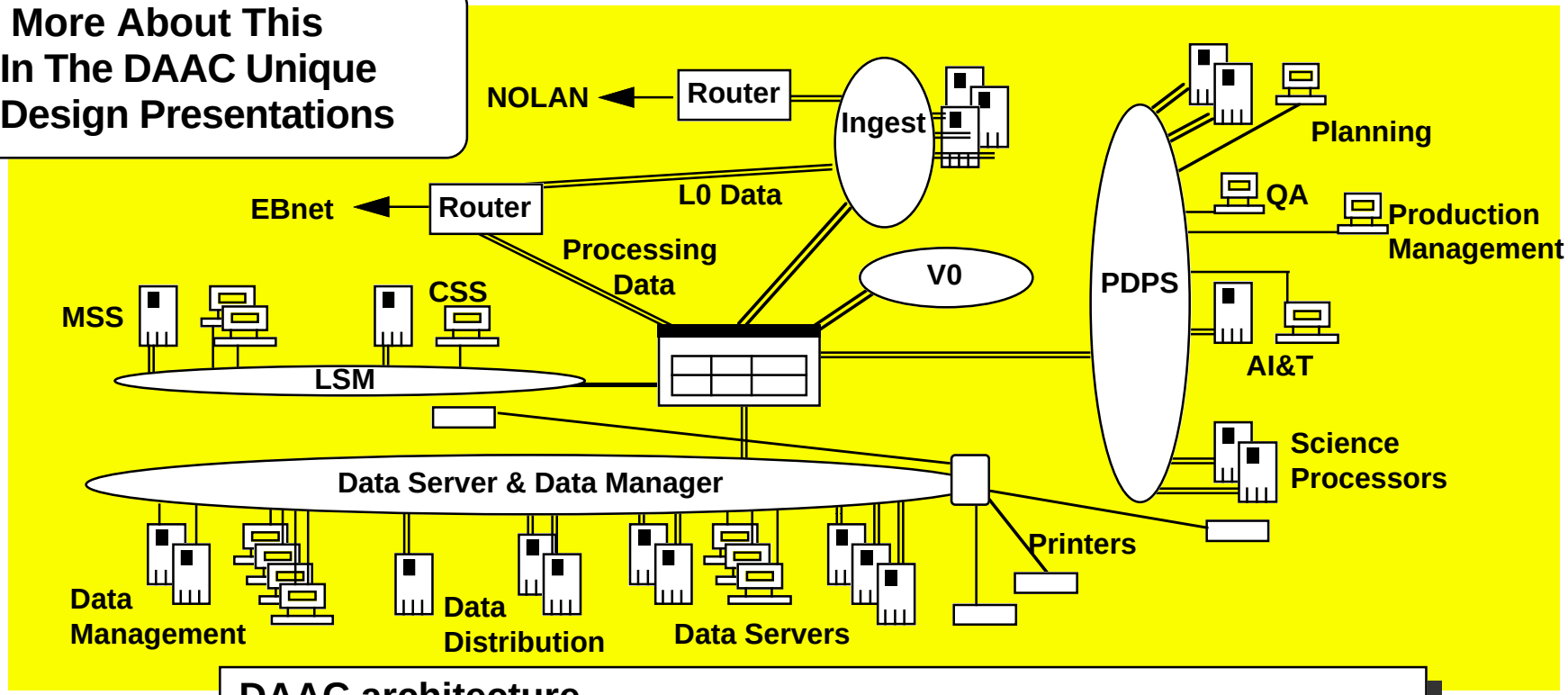
Overview of LAN Architecture - Design Drivers



- **Design drivers**
  - **access patterns (peak versus sustained traffic)**
  - **reduce complexity of data flow**
  - **security considerations**
  - **redundancy to protect against failure**
  - **scalability to Release B**
  - **support for parallel operations and testing in preparation for Release B**

Release A DAAC Networks: Generic Architecture

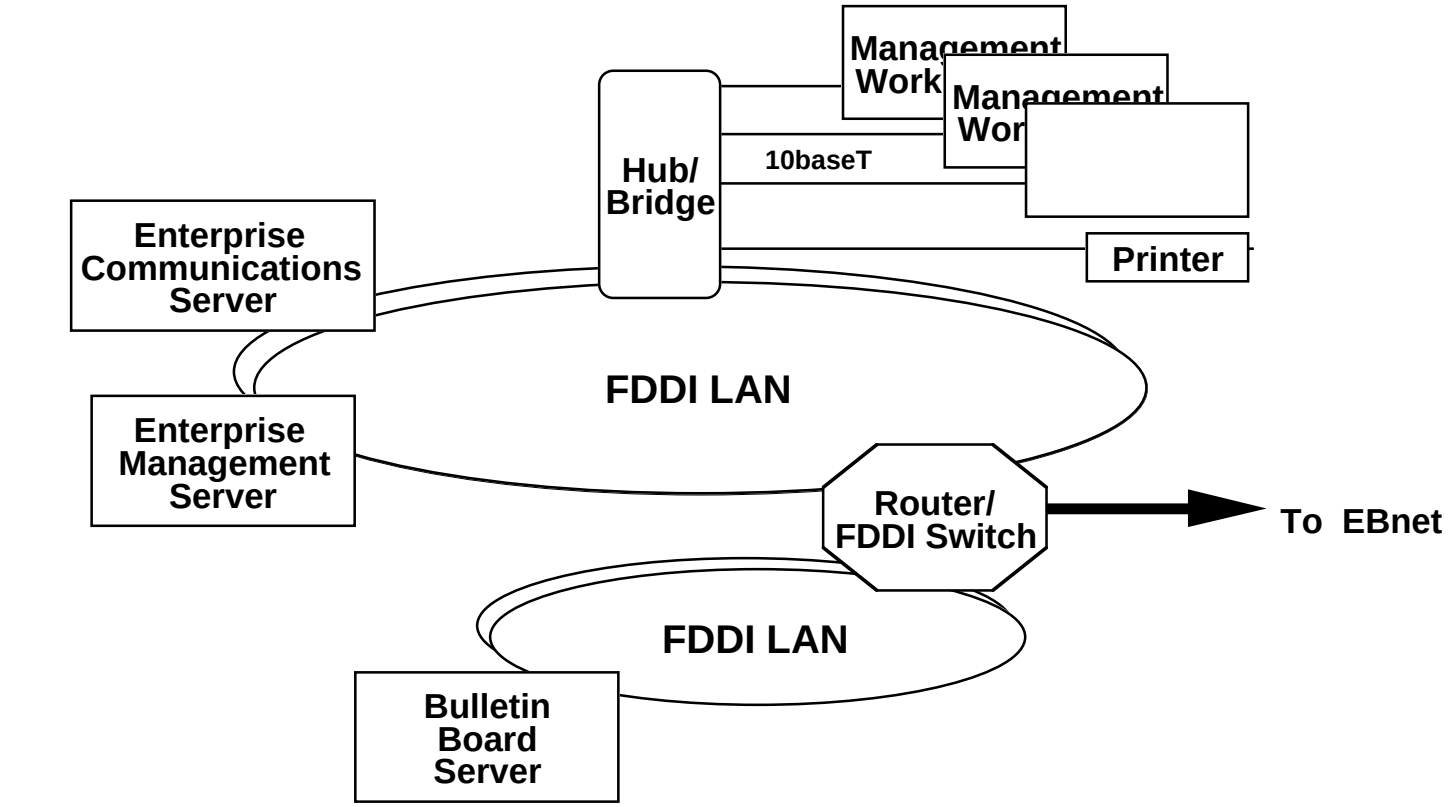
More About This In The DAAC Unique Design Presentations



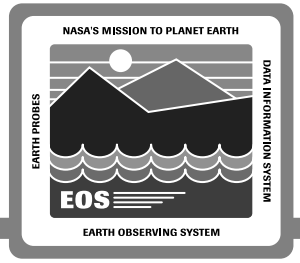
DAAC architecture

- central high-performance FDDI switch
- each FDDI network supports one or two DAAC subsystems
- DAAC-specific topologies

SMC Network Architecture



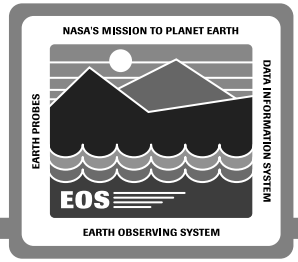
Information Security-Drivers and Strategy



- **Drivers**
  - **Ensure integrity of ECS data**
  - **Provide reasonable accountability and data protection**
  - **Ensure availability of services and data**

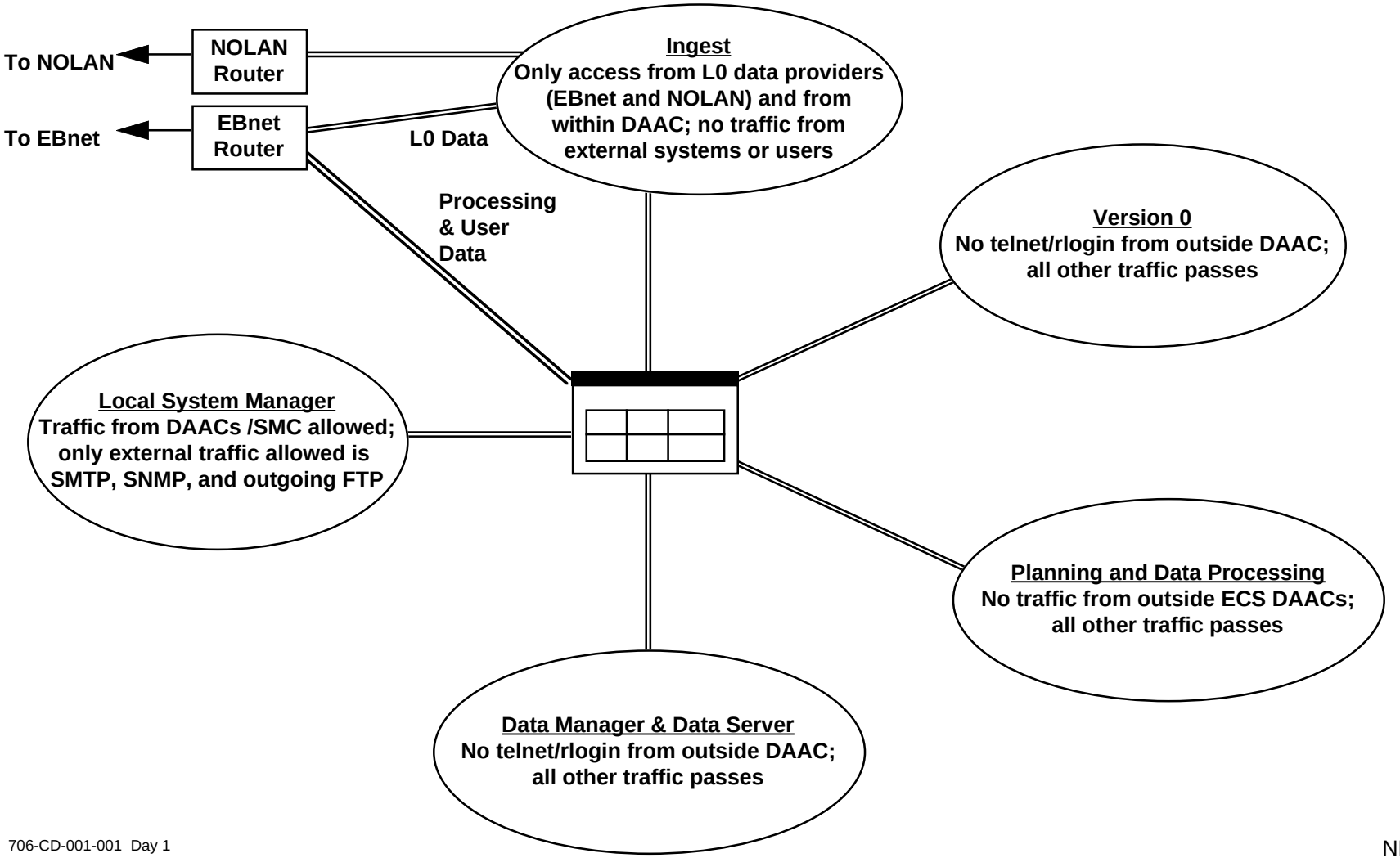
- **Technical Approach (at System Level)**
  - **securing internal interfaces via OSF/DCE**
  - **security gateway for external interfaces**
  - **network-based security**

Network-Based Security Architecture - DAACs

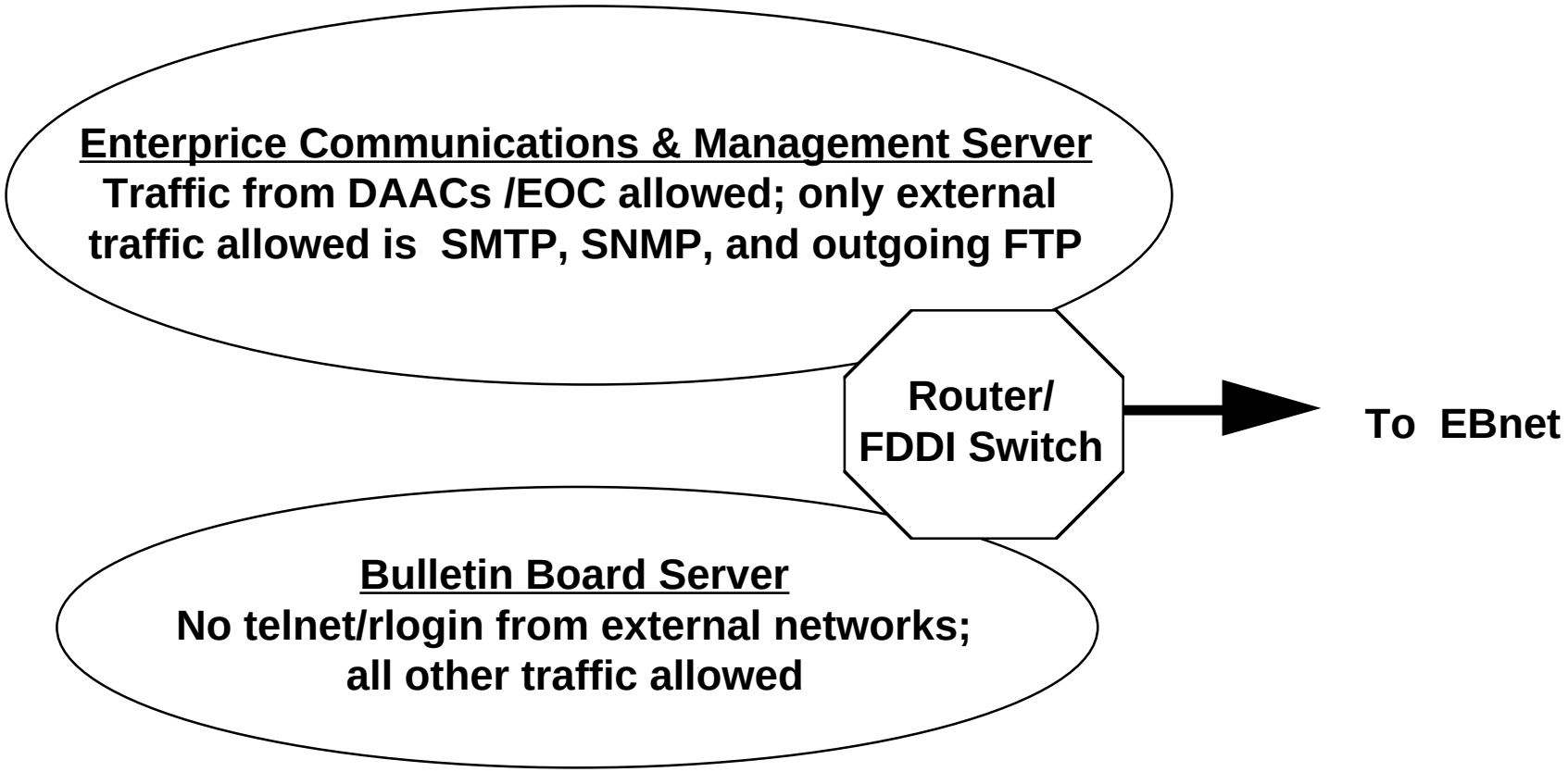


- **Implementation via network and transport layer filters in the FDDI switch (in addition to DCE-based authentication & authorization)**
- **Filters control traffic passage to individual hosts and to whole subsystems**
- **No filtering is performed on outgoing traffic originating at the DAACs**

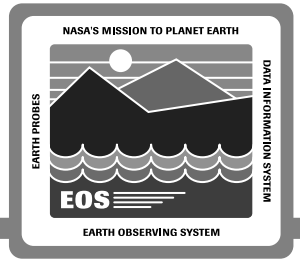
Network-Based Security - Release A DAACs



Network-Based Security - SMC



Release A Hardware CI



Data Management Subsystem (DMS)

- Data Management Server HWCI **DMGHW**

Ingest Subsystem (INS)

- Ingest Client HWCI **ICLHW**

Planning Subsystem (PLS)

- Planning HWCI **PLNHW**

System Management Subsystem (MSS)

- Management Hardware HWCI **MHCI**

Interoperability Subsystem (IOS)

- Advertising Server HWCI **ADSHW**

Data Server Subsystem (DSS)

- Access Control & Management HWCI **ACMHW**
- Working Storage HWCI **WKSHW**
- Document Data Server HWCI **DDSHW**
- Data Repository HWCI **DRPHW**
- Distribution & Ingest Peripherals HWCI **DIPHW**

Data Processing Subsystem (DPS)

- Science Processing HWCI **SPRHW**
- Algorithm QA HWCI **AQAHW**
- Algorithm Integration & Test HWCI **AITHW**

Communications Subsystem (CSS)

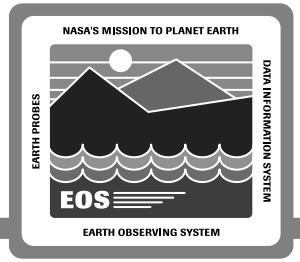
- Distributed Computing HWCI **DCHCI**

Internetworking Subsystem (ISS)

- Internetworking Hardware HWCI **INCI**

- **Hardware Design Presented in Subsystem Presentations**
- **General Sizing Discussion Follows Here**

Sizing Approach - Input data



- **Inputs for sizing**

  - **AHWGP data ("push") as Technical Baseline**

    provides information on processes, input & output files, number of activations, etc. by instrument

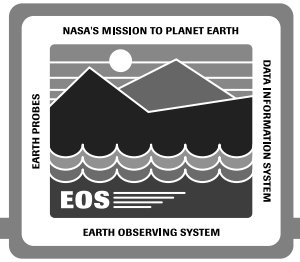
    with epochs corresponding to Releases A and B time frames used

  - **User characterization data ("pull")**

    provides information on projected number of science and non-science users, frequency of search service invocations, percentage of invocations for each search service, etc.

    for Release B time frame used

Sizing and Selection Approach for DBMS

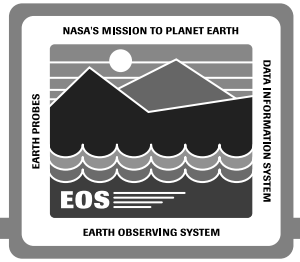


- **Estimated database throughput using transaction rate analysis("push" - production metadata update; "pull" - user access and distribution)**
  - **as an example, for Data Management DBMS to define transaction loadings per service request from User characterization data, six different types of search services were used**

- **Release B numbers applied for estimating Release A sizes (for cost effectiveness)**

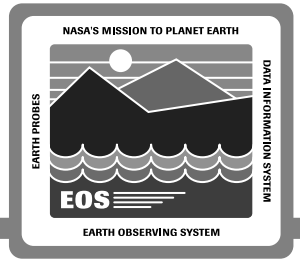
- **Hands-on prototyping and benchmarking analysis (presented at prototype workshop and EPs)**
  - **access rates, loadings, performance comparisons, overhead, etc.**

Sizing and Selection Approach for DBMS (Cont.)



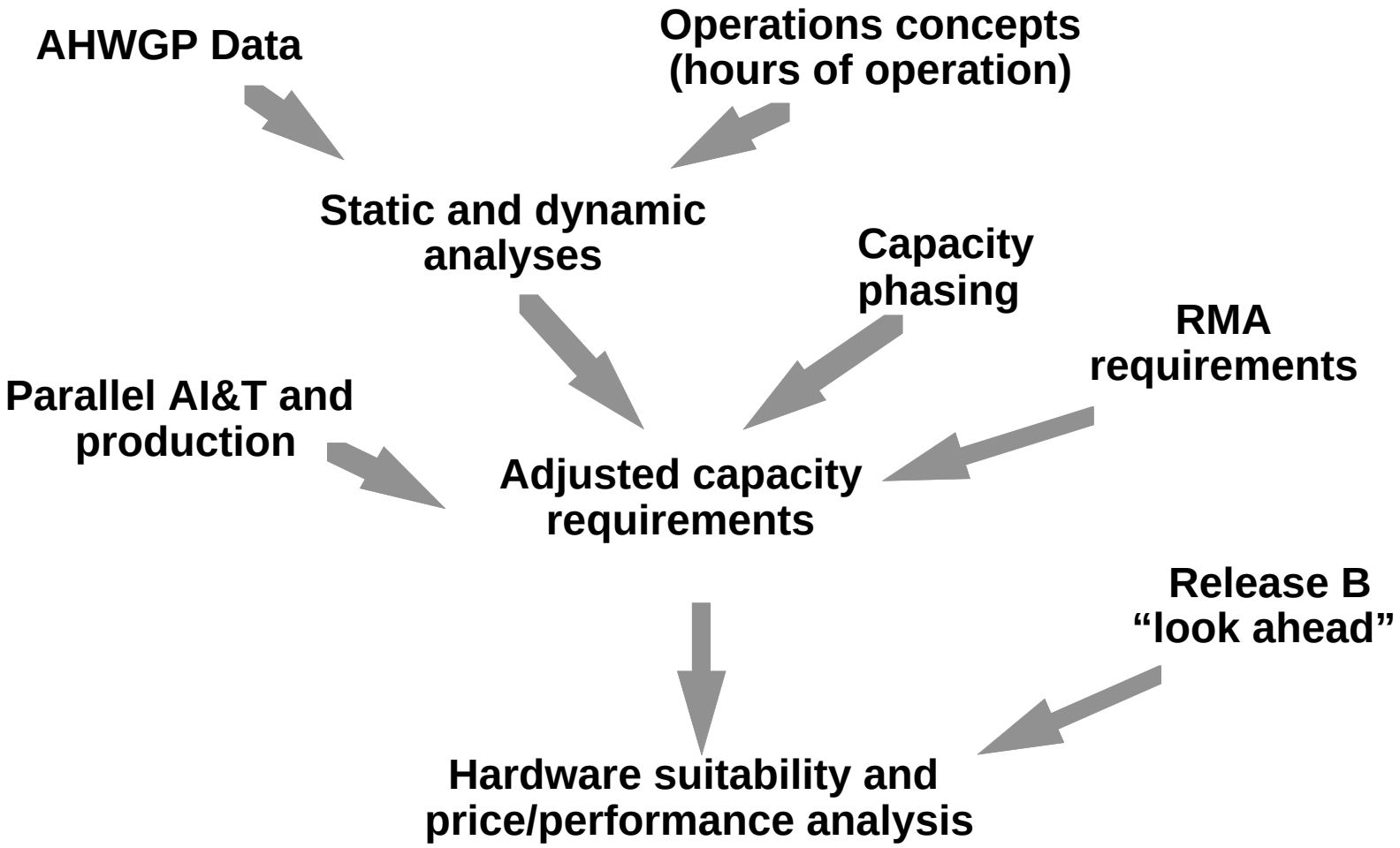
- **Operations concepts**
  - **as an example for Planning DBMS, number of working hours, number of short and long term plans, etc.**
- **RMA analysis to provide redundancy to protect against equipment failures**
- **Price/performance analysis**

Sizing and Selection Approach - Servers

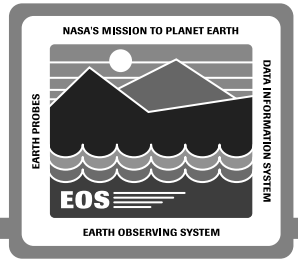


- **Estimated processing and I/O loads based on DBMS, DCE usage (EDF prototyping)**
- **Estimated price/performance**
- **Ability to run OODCE**
- **Availability of COTS**
- **Scalability**

Sizing and Selection Approach - Science Processors

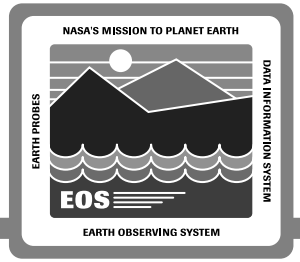


Sizing Approach - Disks and Storage Devices



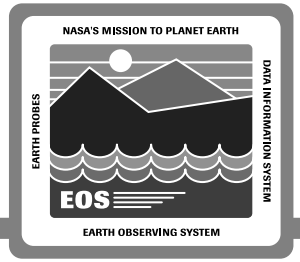
- **Dynamic modeling using ECS Systems Performance Model used to size permanent data repository components (number of robotics arms, tape drives, production related staging disks)**
  - **nominal and peak resource utilization**
- **Other disks (e.g. MSS and CSS subsystems) based on static analysis**
  - **frequency of transmission of the necessary information of all the appropriate attributes of the managed objects during one hour period**
  - **14 days worth of HP Openview data**
  - **DCE directory, DCE security, mail, etc.**

Sizing Approach - Disks and Storage Devices (Cont.)



- **User modeling was used to estimate user access rates**
- **Device counts including juke boxes, stackers and drives were driven by RMA requirements and less by volume**
- **RMA requirements, failover strategies and operational growth for Release B were considered**
- **DBMS server disks were based on the core metadata as defined in the Core Metadata Standards**
- **V0 data sets identified for migration**

Sizing Approach: Networks



Data Flow Estimates
(Static, Dynamic Modeling)

Apply Sizing Factors
(Protocol Overhead, Utilization , etc.)

Aggregation
By Subsystem

Select Type of Network